Internal Medicine Update USNAC 2015

CAPT R. Wesley Farr, MC, USN
Infectious Diseases
Aerospace Medicine
Naval Aerospace Medical Institute

Robert. farr@med.navy.mil

Disclosures

- The views expressed in this presentation are those of the author and do not reflect the official policy or position of the U.S. Department of the Navy, U.S. Department of Defense, or the U.S. government.
- No financial, professional, or personal conflict of interest

Objectives

- Apply recent revisions in ARWG to your aeromedical practice
- Evaluate elevated fasting glucose for AMS submission
- Evaluate thrombocytopenia for AMS submission
- Evaluate Prolonged QTc Interval for AMS submission

Outline

- 5.1 Diabetes mellitus/Prediabetes
- Thrombocytopenia
- Prolonged QTc
- Ebola

Categories of Increased Risk for Diabetes

- Impaired Fasting Glucose (IFG)
  - FPG 100-125 mg/mL (5.6-6.9 mmol/L)
- Impaired Glucose Tolerance (IGT)
  - 2-h plasma glucose in75-g OGTT 140-199 mg/dL (7.8-11.0)
- Prediabetes
  - HgbA1c 5.7-6.4%

American Diabetes Association. Diabetes Care 2011;34(Suppl 1);S11-S61.

Significance of Prediabetes

- Not clinical entities
- Risk factors for future diabetes and cardiovascular disease (CVD)
- Strong continuous association between HgbA1c and future diabetes

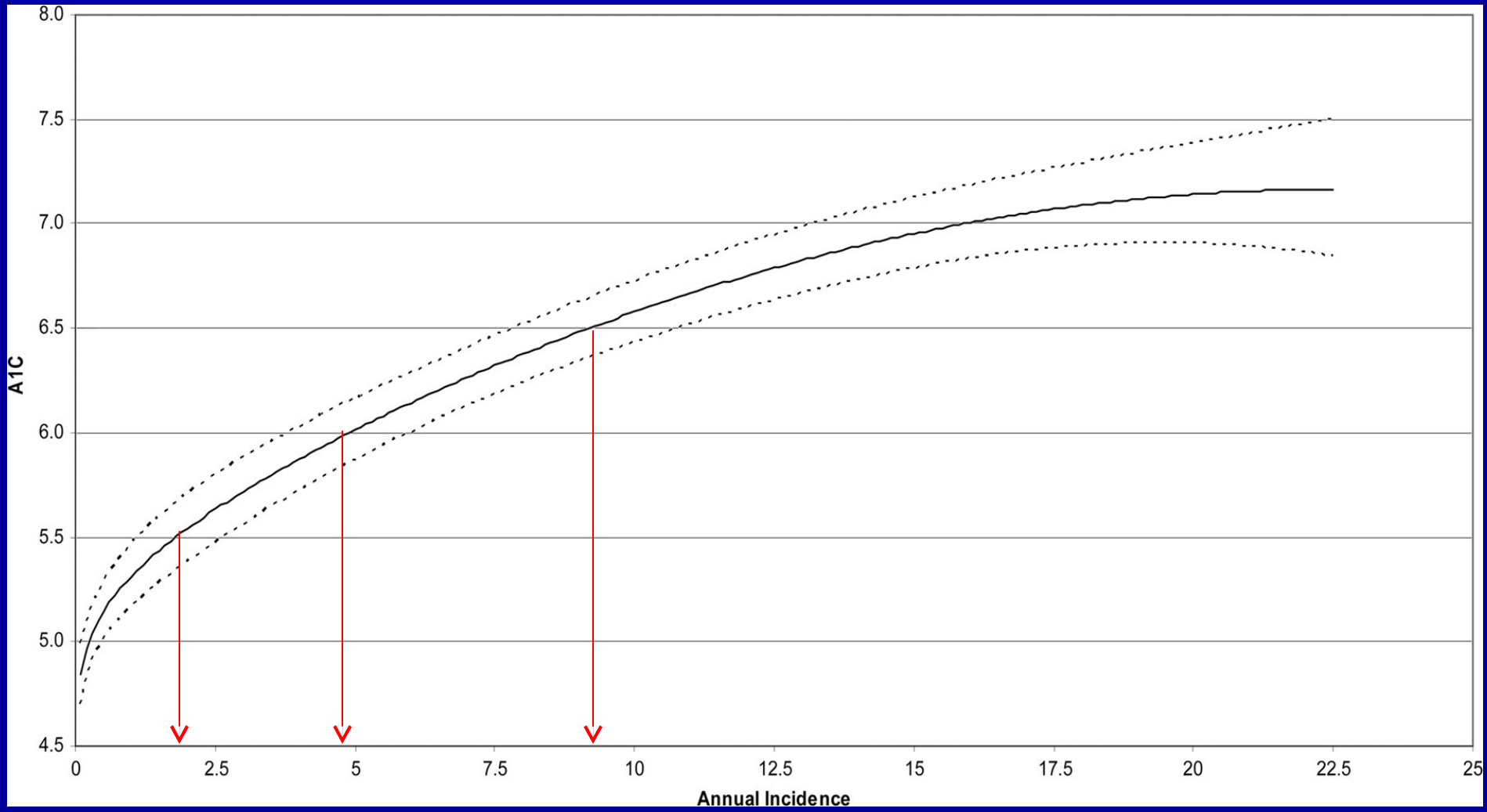
American Diabetes Association. Diabetes Care 2011;34(Suppl 1);S11-S61.

A1c Level and Risk of Diabetes

- Risk of DM increased steeply from A1C 5.0-6.5
- A1C 6.0-6.5%- risk 20 or more times greater than A1C <5.0%
- A1C 5.5-6.0%- risk 5 times greater than A1C <5.0%
- A1C 5.0-5.5%- risk 2 times greater than A1C <5.0%

- Zhang et al. A1C level and future risk of diabetes: a systematic review. Diabetes Care 2010;33;1115-1673.

A1C modeled as a function of annualized incidence.



Zhang X et al. Dia Care 2010;33:1665-1673

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American Diabetes Association.

Waiver Requirements for Prediabetes

- 5.1.1 Dysglycemia- new section separate from Diabetes mellitus
- Aviator does not need to be grounded during evaluation
- Family Medicine or Int Med consult
- Fundoscopic exam
- Nutrition consult
- FBG; HgbA1c < 6.5, TSH, CMP, Lipids, UA, Urine microalbumin:urine creatinine ratio (<300)

Impact on Workload

	JUL 2013-MAR 2014	APR 2014- JAN 2015
NAMI IM Consults	0	4
NAMI IM Clinical Advisories	1	16

Thrombocytopenia

	JUL 2013-JAN 2015
NAMI IM Consults	17
NAMI IM Clinical Advisories	14

Case Study- Thrombocytopenia

- **Prob- Asked by Dr. McKee to see 21-y-o AD USN male NAC rescue swimmer applicant with thrombocytopenia.**
- **HPI- Asymptomatic with thrombocytopenia (99K, 111K).**
- **High school- football, wrestling**
- **PFA- Sit-ups- 80; Push-ups- 80; 1.5 mile Run- 9:00**
- **Surgery- Left ACL reconstruction 2008**
- **ROS- neg**
- **PE- WNL**

	1 AUG 14	3 DEC 14	9 DEC 14	10 DEC 14
Platelets	128K	111K	99K	108K
Hgb	15.8	15.1	15.1	15.0
Hct	44.8	44.6	44.9	42.7
WBC	7,700	3,700	3,400	3,900
CMP				WNL
UA	WNL			
LDH (98-192)				139

	1 AUG 14	3 DEC 14	9 DEC 14	10 DEC 14
B12 (180-914)				611
Folate (5.9-24.8)				12
Iron (45-182)				128
Ferritin (23.9-336.2)				44.3
Ferritin (23.9-336.2)				44.3

	1 AUG 14	3 DEC 14	9 DEC 14	10 DEC 14
Anti-HIV	neg			
HBs Ag	neg			
Anti-HCV	neg			
H pylori Ab				<0.9- neg
Chest PA/LAT				WNL
US Liver Spleen				WNL

Case Study

- **Impression- Thrombocytopenia-CD**
- **Aeromedical Disposition- NPQ-waiver recommended.**
- **Recommendations-**
  - **No restrictions on flight activities**
  - **Annual waiver submissions with CBC and platelet count >100K**

Thrombocytopenia

- ARWG pending
- Platelet count less than 150K- CD
- Waiver recommended-
  - Stable platelet count 100-150K
  - Negative lab and imaging work-up
- Hematology consult-
  - Platelet count less than 100K
  - Bone marrow

Thrombocytopenia Eval

- CBC, UA, CMP, LDH
- B12, Folate, Iron, Ferritin
- TSH
- HIV Ab, HBsAg, HCV Ab; H pylori Ab
- CXR PA/Lat
- US spleen/liver

Prolonged QTc

- ARWG pending
- QT interval- measurement
  - Varies with heart rate
  - Shortens with fast HR
  - Lengthens with slow HR
- QTc- Corrected QT interval

Aeromedical Concerns of Prolonged QTc

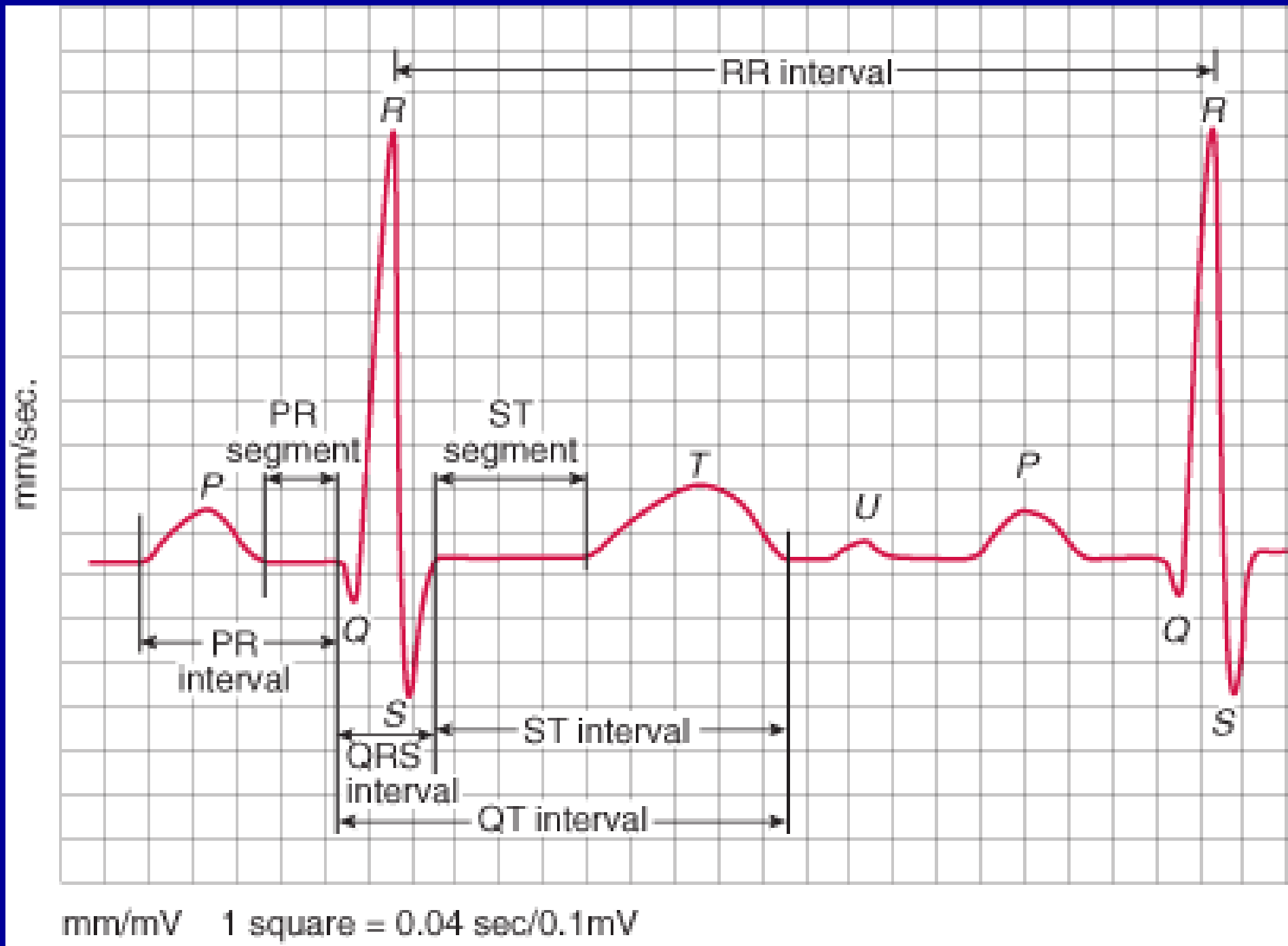
- Syncope, ventricular tachycardia, sudden cardiac death
- Medications
- Hypocalcemia
- Hypothyroidism
- Congenital Long QT Syndrome (LQTS)

Medications- Prolonged QT

- https://www.crediblemeds.org/
- Anti-arrhythmics
- Anti-microbials- macrolides, fluoroquinolones, cholorquine, methadone
- Anti-psychotics
- Anti-depressants- SSRI,

Congenital LQTS

- Syncope and cardiac arrest in childhood and teenagers
- Rapid, polymorphic v tach
- Over 300 mutations in 7 genes accounting for 70% of patients with LQTS
- Genetic testing
  - 5 cardiac ion channel genes
  - Sensitivity 70%


RR interval
R
R
PR
segment
ST
segment
P
T
U
P
PR
interval
Q
Q
S
S
ST interval
QRS
interval
QT interval
mm/sec.
mm/mV
1 square = 0.04 sec/0.1mV

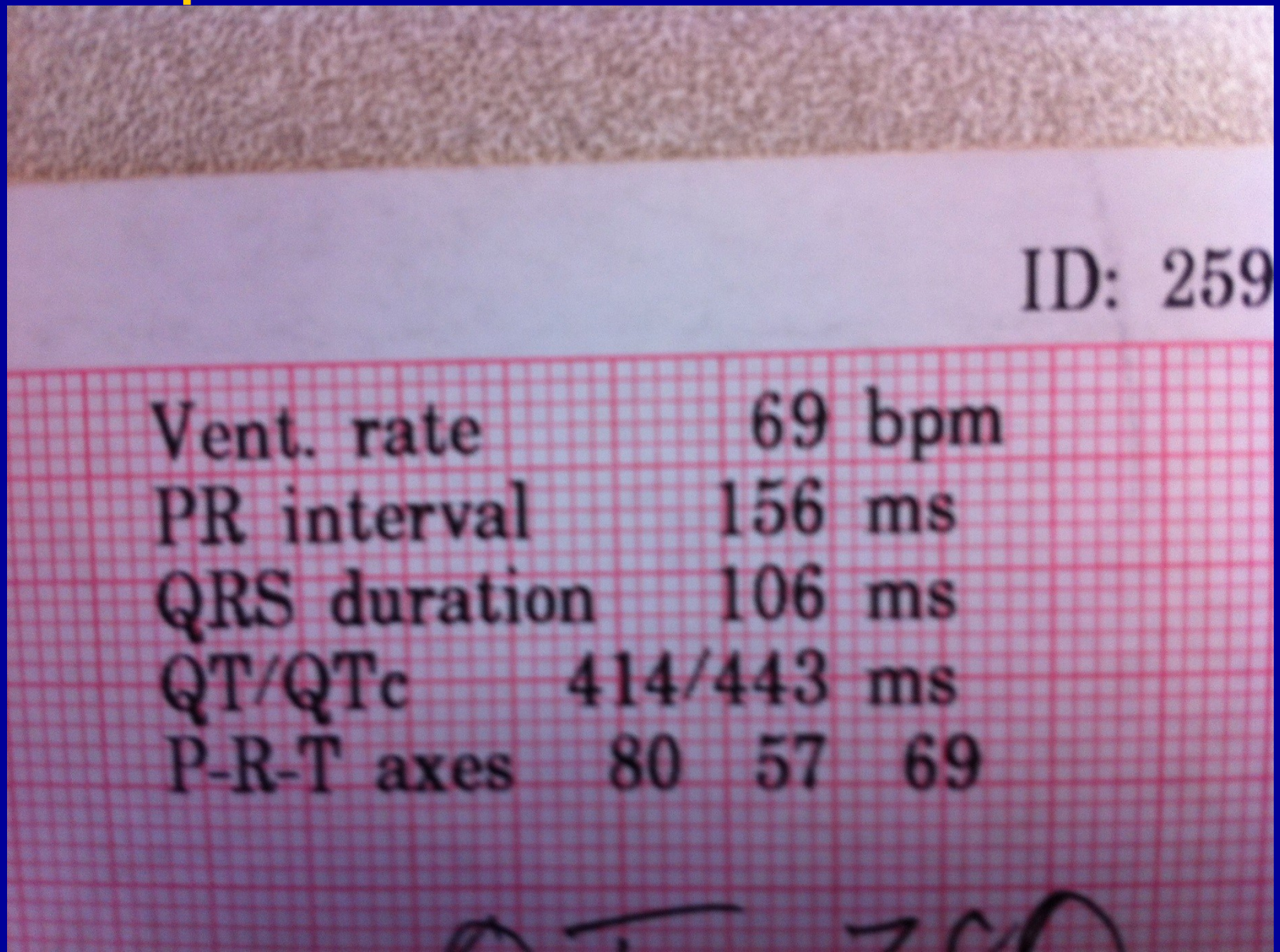
Corrected QT (QTc)

- Bazette's formula
- QTc = QT (sec)/ square root of RR (sec)
- Ex- QTc = .400 sec/ square root of 1.0 sec = .400 sec
- http://www.medcalc.com/qtc.html
- http://www.mdcalc.com/corrected-qt-interval-qtc/
- http://en.ecgpedia.org/wiki/QTc_Calculator

Measurement of QT/QTc

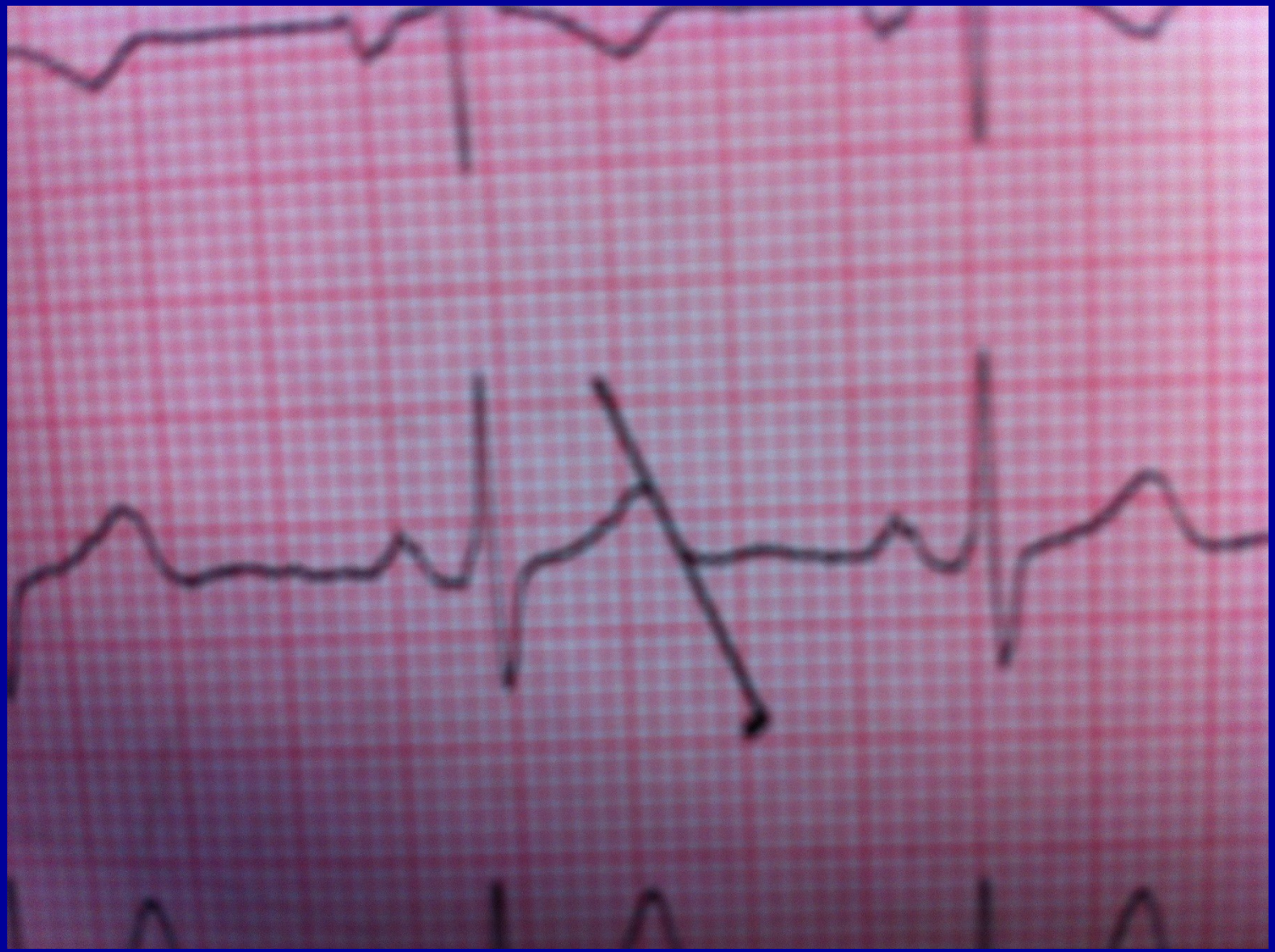
- ECG computer
  - Often artificially prolonged QT- tail of T wave
- Manual measurement of QT
  - Draw slope of T wave on paper
  - Mark where T slope crosses isolectric point
  - Manually measure QT interval and insert in calculator

Computer QT/QTc

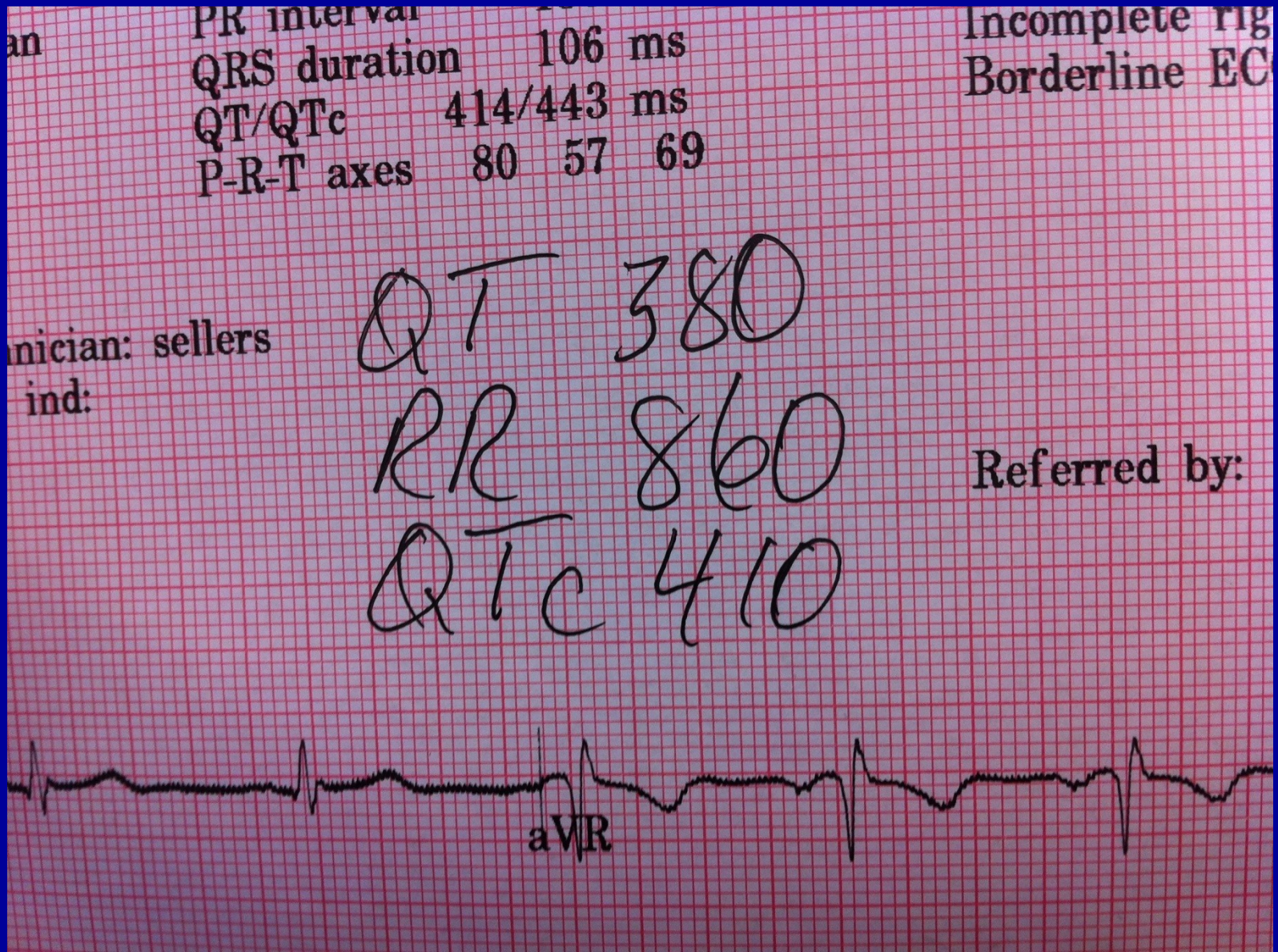


Preferred Straight Edge

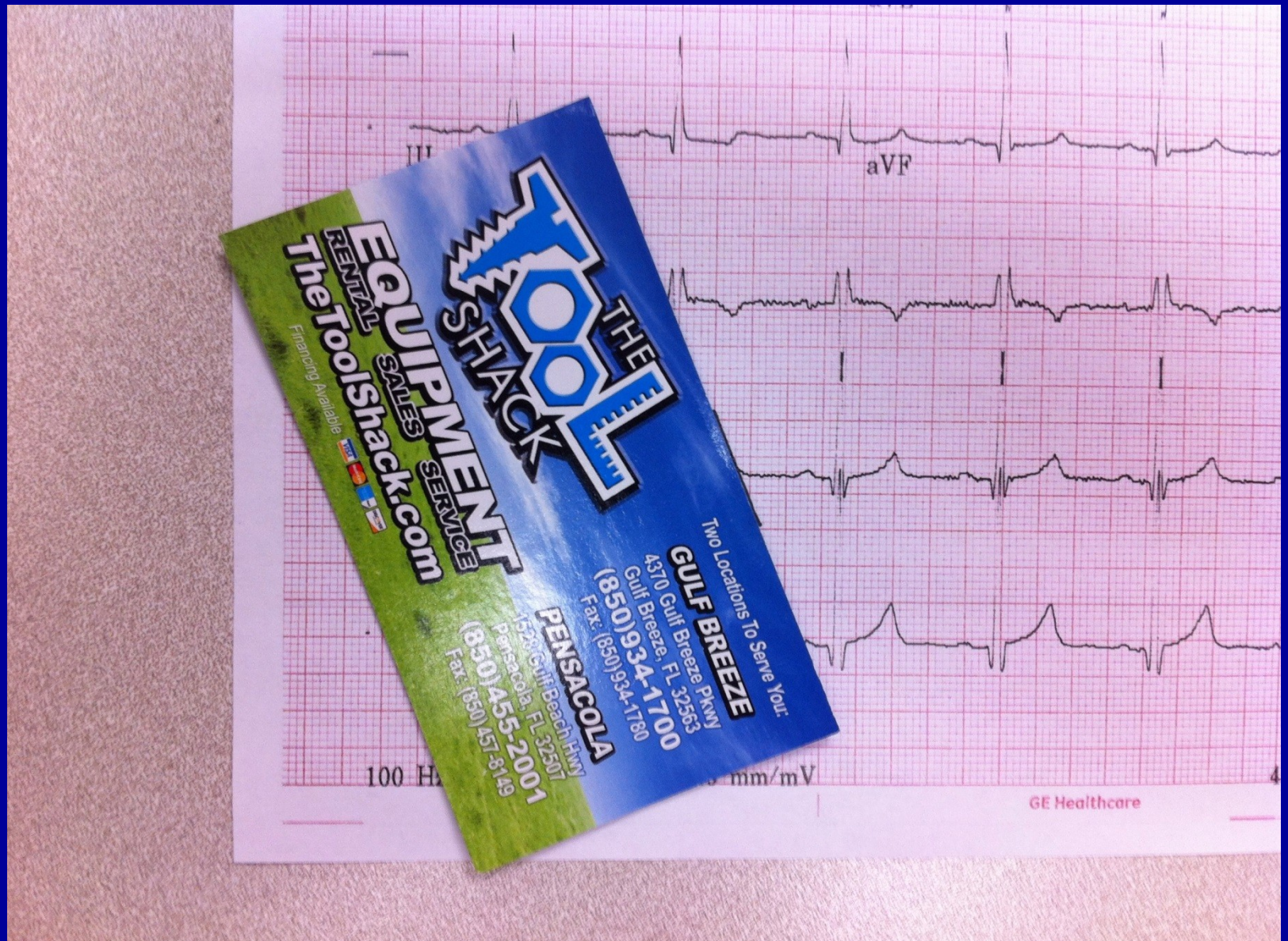
T Wave Downslope



Manual QT/QTc



Alternative Straight Edge



Disclosures

- No financial interest in Skilcraft or The Tool Shack

Proposed Prolonged QT Interval Policy

- Manual QTc <440 msec males (<460 females)- NCD
- Manual QTc 440-459 msec males (460-479 msec females)- CD, Waiver considered. Worksheet.
- Manual QTc 460-499 msec males (480-499 msec females)- CD, Waiver considered. Worksheet, EST, Cardiology
- Manual QTc ≥500 msec males (≥500 msec females)- CD, Waiver not considered

Prolonged QT Interval Worksheet

- Personal History (present or past history)
  - Yes___No___Palpitations
  - Yes___No___Presyncope
  - Yes___No___Syncope (with stress)
  - Yes___No___Syncope (without stress)
  - Yes___No___Cardiac Arrest
  - Yes___No___Long QT Syndrome

Prolonged QT Interval Worksheet

- Yes___No___Medications (prescription/OTC/supplements) (list)
  - _____
  - _____
  - _____
- Family History
  - Yes___No___Unexplained sudden cardiac death (any first degree relative prior to the age of 30 without antecedent trauma or prolonged illness)
  - Yes___No___Long QT Syndrome
- Obtain EST and Cardiology Consult if Personal

Prolonged QT Interval Worksheet

- Lab- K^{+}, Ca^{2+}, TSH
- Supine and Standing (30 seconds after standing from supine) 12 Lead Electrocardiograms

Date	Type ECG	HR	QT (msec) (computer)	QTc (computer)	Manual QT	Manual RR	Manual QTc
	Initial Screening						
	Supine						
	Standing						

Coca-Cola
a little chaos goes a long way.

Disclosures

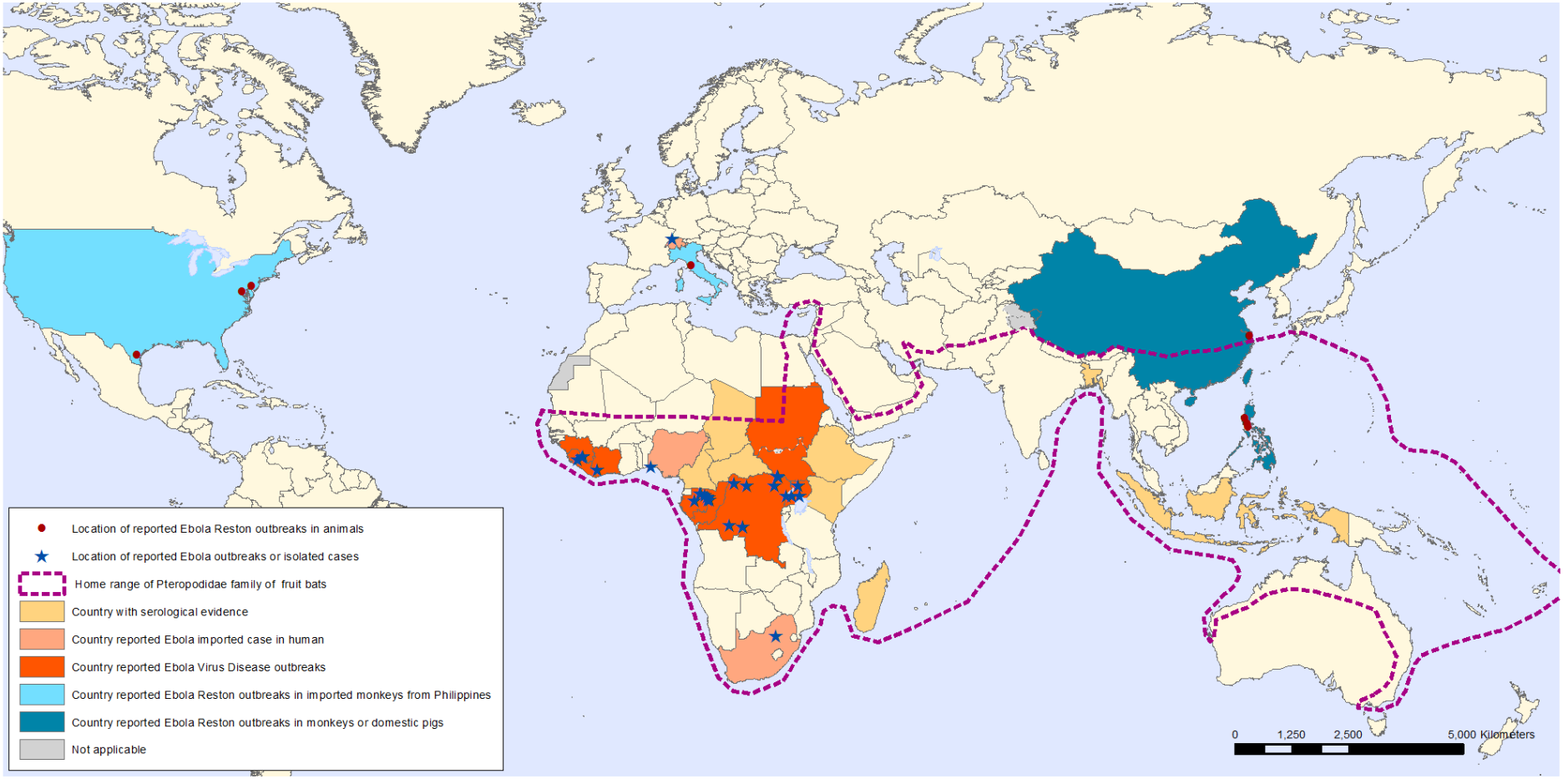
- I do have financial interest in Coca Cola.
- 10 shares in USAA brokerage account

Table: Chronology of previous Ebola virus disease outbreaks 1972-2012

- 2387 cases in 28 outbreaks
  - Range 1-425; Mean 85.3
- 1590 fatalities (66.6% fatality rate)
  - Range 0-280; Mean 56.8
- Single country outbreaks

- http://www.who.int/mediacentre/factsheets/fs103/en/

Geographic distribution of Ebola virus disease outbreaks in humans and animals


Location of reported Ebola Reston outbreaks in animals
Location of reported Ebola outbreaks or isolated cases
Home range of Pteropodidae family of fruit bats
Country with serological evidence
Country reported Ebola imported case in human
Country reported Ebola Virus Disease outbreaks
Country reported Ebola Reston outbreaks in imported monkeys from Philippines
Country reported Ebola Reston outbreaks in monkeys or domestic pigs
Not applicable
0
1,250
2,500
5,000 Kilometers

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization

World Health Organization

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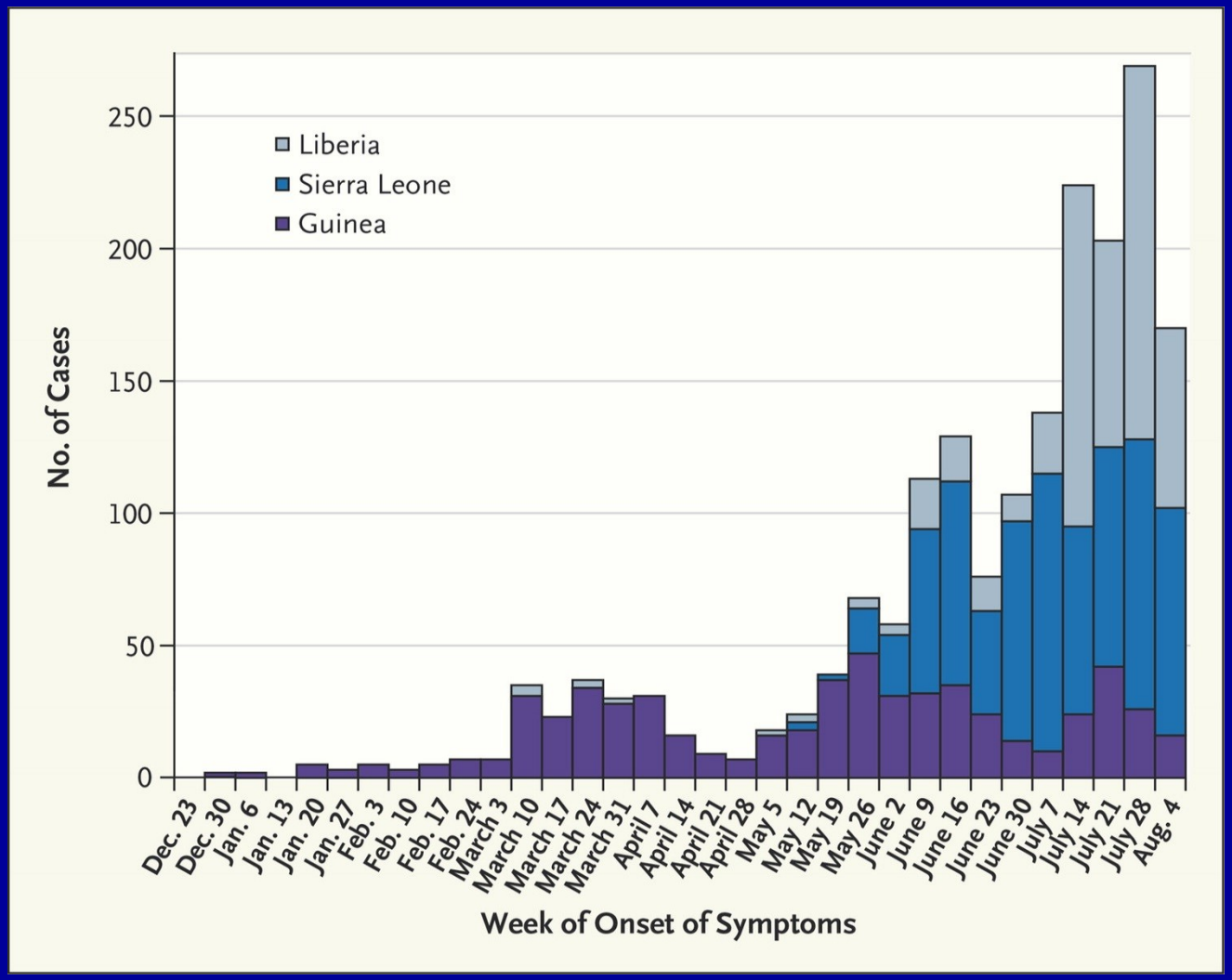
Countries with Widespread Transmission

Country	Total Cases	Laboratory-Confirmed Cases	Total Deaths
Guinea	2793	2493	1797
Liberia	8623	3123	3515
Sierra Leone	10030	7759	2977
Total	**21086**	**13376**	**8289**

- **CDC. January 9, 2015. h**ttp://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case-counts.html

Guinea
Sierra Leone
Liberia
Côte d'Ivoire
Levels of Transmission
New Active Area
Active
Not Active
Ebola Treatment Units
Laboratory
Transit Center
Hospital
Ebola Treatment Unit (ETU)
United States
Source: WHO: Ebola Response Roadmap
10 October 2014

Numbers of Confirmed and Probable Ebola Cases Reported Weekly from Guinea, Sierra Leone, and Liberia from December 23, 2013, to August 11, 2014.



Briand S et al. N Engl J Med 2014;371:1180-1183.

The NEW ENGLAND JOURNAL of MEDICINE

Chain of Infection- E

- Agent- Ebola virus
- Reservoir- Fruit bats of the *Pteropodida*

- Secondary- chimpanzees, gorillas, monkeys, forest antelope and porcupines

Chain of Infection- Ebola

- Transmission
  - Close contact with the blood, secretions, organs or other bodily fluids of infected animals
  - Human to human transmission
- Host- Humans
- Syndrome- Viral hemorrhagic fever

Human-to-Human Transmission

- Direct contact through broken skin or mucous membranes
- Blood, secretions, organs, body fluids
- Surfaces and materials- bedding, clothing
- Burial ceremonies- direct contact with body
- Transmission through semen for up to 7 weeks
- http://www.who.int/mediacentre/factsheets/fs103/

WAR on TERROR's FRONTLINE TROOPS...

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AGAINST TERRORISTS

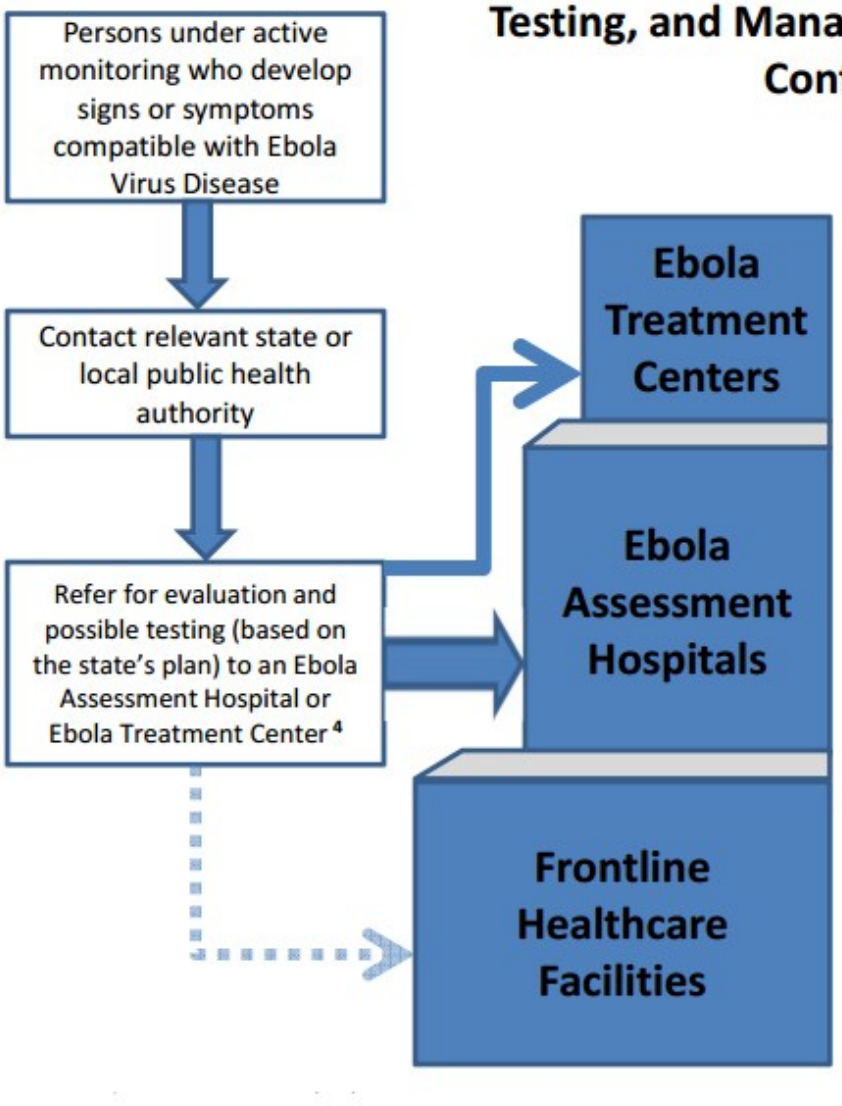
AGAINST EBOLA

Ebola in the DoD

- Chairman of the Joint Chiefs of Staff Instruction 4220.01: Post-deployment policy for 21-day controlled monitoring of DoD Service members, civilians, and contractors returning from Ebola Virus Disease outbreak areas in West Africa and CONUS
- MHS References and Training Files
  - https://mhs.health.mil/References/REF_Ebola.cshtml
  - PPE list for HCW
  - DD Form 2991- EVD Re-deployment Risk Assessment
  - DD Form 2990- EVD Exposure Risk Evaluation
- DoD personnel in Liberia- logisitics; HCW trainers
- USNORTHCOM- deploy within the United States in support of Civil Authorities

UPDATED 01 06 2015

Interim Guidance for Hospital Preparedness for Evaluation, Testing, and Management of Patients under Investigation or with Confirmed Ebola Virus Disease (EVD)


Persons under active monitoring who develop signs or symptoms compatible with Ebola Virus Disease
Contact relevant state or local public health authority
Refer for evaluation and possible testing (based on the state's plan) to an Ebola Assessment Hospital or Ebola Treatment Center [4]
Ebola Treatment Centers
Ebola Assessment Hospitals
Frontline Healthcare Facilities

	Capabilities	PPE[1] Needs
Ebola Treatment Centers	• Care for and manage patient throughout disease process	• Maintain Ebola PPE[2] sufficient for at least 7 days of patient care
Ebola Assessment Hospitals	• Evaluate and care for patient for up to 96 hours or until discharged or transferred • Initiate Ebola testing and transport patient to Ebola treatment Center if lab-confirmed EVD • Staff trained and proficient in donning/doffing, proper waste management, infection control practices and specimen transport	• The use of PPE should be based on the patient's clinical status[3] • Maintain Ebola PPE[2] sufficient for 4-5 days of patient care
Frontline Healthcare Facilities	• Identify patients with relevant exposure history[5] and Ebola-compatible symptoms • Isolate patients • Inform health department • Initiate testing if low risk; high risk should be transferred for evaluation and testing • Staff trained on specimen transport, waste management, Standard Precautions; proficient in donning/doffing	• The use of PPE should be based on the patient's clinical status[3] • PPE for clinically stable patients[3] should be sufficient for most patients • Maintain access to Ebola PPE[2] sufficient for 12-24 hours of patient care, to be used if needed

http://www.cdc.gov/vhf/ebola/hcp/us-hospital-preparedness.html

- http://www.who.int/features/2014/ebola-swab-liberia/photo-story/en/

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Questions